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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/470,446	12/22/1999	NITIN INGLE	A-67178/AJT/	6156

7590

09/24/2002

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EXAMINER

ZERVIGON, RUDY

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 09/24/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

RCE in paper →
Not AF
IS paper 13 a Final?

Office Action Summary

Application N .

09/470,446

Applicant(s)

INGLE ET AL.

Examiner

Rudy Zervigon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 8-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 8-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 12 October 2001 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1, 6, 9, 11, 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawakami Soichiro (JP61-37969)¹. Kawakami Soichiro describes:
 - i. 1. A gas delivery metering tube (item 23, Figure 3 - Figures 1,2) for delivering a gas (Purpose, first line), comprising:
 - ii. at least one innermost (item 3, Fig.1,2) tube attached to a gas supply (5, Figure 1, page 6, last paragraph of translation) at one end and capped at the other – Figure 1 shows the innermost tube (3) as “capped” at the extreme end opposing the gas supply
 - iii. at least one outermost (items 2,1, Fig.1,2) tube, both the inner and outermost axially aligned tubes, elongated, nested tubes having an effective annular space (items 18-20, Figures 1,2; “buffers”, Constitution) formed between the at least one innermost (item 3, Fig.1,2) and outermost (items 2,1, Fig.1,2) nested tubes;

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- iv. one or more arrays of orifices (items 13, 14, 15; Fig. 1,2) formed in each of the at least innermost (item 3, Fig.1,2) and outermost (items 2,1, Fig.1,2) nested tubes and extending along the substantial length (Figures 1,2) of each of the tubes
- v. wherein the one or more arrays of orifices formed in said innermost tube establishes a substantially uniform ("stably and uniformly", Constitution) backing pressure along substantially the length of the innermost (item 3, Fig.1,2) tube, thereby promoting substantially uniform ("stably and uniformly", Constitution) delivery of the gas (Purpose, first line) out of the orifices (items 13, 14, 15; Fig. 1,2) in the outermost (items 2,1, Fig.1,2) tube and along substantially the length of the outermost (items 2,1, Fig.1,2) tube
- vi. 6. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 wherein the metering tube (item 23, Figure 3 - Figures 1,2) is used in a chemical vapor deposition system.
- vii. 7. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 wherein gas (Purpose, first line) is supplied to one end (interface of items 5 and 4 - Figure 1) of the innermost (item 3, Fig.1,2) nested tube.
- viii. 9. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 wherein the nested tubes are cylindrical.
- ix. 11. In combination, the gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 and at least one injector assembly (item 4, Figure 1, item 6a, Fig.4) having at least one port (item 8, Figure 1, item 3a, Fig.4) for receiving the gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2).

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- x. 12. In combination, the gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 and at least one shield (item 21, Figure 3) assembly having at least one plenum (inside portion of item 21, Figure 3) for receiving the gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2).

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Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2-5, 8, 10, and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami Soichiro (JP61-37969)², as applied to claims 1, 6, 9, 11, 12 above. Kawakami Soichiro does not describe:

- xi. 2. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 wherein the effective annular space (items 18-20, Figures 1,2; "buffers", Constitution) has an effective diameter D_{eff} and the innermost (item 3, Fig.1,2) tube has an inner diameter D_{in} , and D_{eff} and D_{in} are within a factor of three of each other.
- xii. 3. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 2 wherein D_{eff} is approximately equal to D_{in} .
- xiii. 4. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 wherein a ratio of the surface area of the outermost (items 2,1, Fig.1,2) tube to the

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total cross sectional area of the orifices (items 13, 14, 15; Fig. 1,2) formed in the outermost (items 2,1, Fig.1,2) tube is equal to or greater than approximately 10.

- xiv. 5. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 4 wherein the ratio is greater than 100.
- xv. 8. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 wherein the innermost (item 3, Fig.1,2)tube has a length and a diameter and the ratio of the length to the diameter is in the range of approximately less than 70.
- xvi. 10. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 wherein the nested tubes are rectangular.
- xvii. 13. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 1 wherein the innermost (item 3, Fig.1,2)tube has the following properties:

$$L/D < 70$$

$$D/d \approx > 10$$

$$Na_{\text{port}}/A_{\text{tube}} \approx \leq 1$$

where L is the length and D is the diameter of the innermost (item 3, Fig.1,2)tube, d is the diameter of one orifice in the array of orifices (items 13, 14, 15; Fig. 1,2) in the innermost (item 3, Fig.1,2)tube, N is the number of orifices (items 13, 14, 15; Fig. 1,2) in the innermost (item 3, Fig.1,2)tube, A_{port} is the cross sectional area of each of the orifices (items 13, 14, 15; Fig. 1,2), and A_{tube} is the area of the innermost (item 3, Fig.1,2) tube; and the outermost (items 2,1, Fig.1,2) tube has the following properties:

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D_{eff} and D_{in} are within a factor of three of each other

$SurfaceArea_{outer}/NA_{outer} \approx 10$ or more

where D_{eff} is the effective annular space (items 18-20, Figures 1,2; "buffers", Constitution), $SurfaceArea_{outer}$ is the surface area of the outermost (items 2,1, Fig.1,2) tube and NA_{outer} is the total cross sectional area of all of the orifices (items 13, 14, 15; Fig. 1,2) in the outermost (items 2,1, Fig.1,2) tube.

- xviii. 14. The gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 13 wherein D_{eff} is approximately equal to D_{in} .
- xix. 15. In combination, the gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 13 and at least one injector assembly (item 4, Figure 1, item 6a, Fig.4) having at least one port (item 8, Figure 1, item 3a, Fig.4) for receiving the gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2).
- xx. 16. In combination, the gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2) of claim 13 and at least one shield (item 21, Figure 3) assembly having at least one plenum (inside portion of item 21, Figure 3) for receiving the gas (Purpose, first line) delivery metering tube (item 23, Figure 3 - Figures 1,2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary either the dimensions (L,D) of the gas delivery metering tube or vary the distribution (Na_{port}) and/or the dimension ($d, A_{port/tube}$) of the orifice and/or tube dimensions.

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Motivation for varying either the dimensions (L,D) of the gas delivery metering tube or varying the distribution ($N_{a_{port}}$) and/or the dimension ($d, A_{port/tube}$) of the orifice and/or tube dimensions is drawn from the level of ordinary skill in the art to accomplish the stated "Constitution" - "...the reaction gas is supplied stably and uniformly into the anode from a port 13 of the peripheral wall of the cathode 1." and "To supply stably a reaction gas and to form a uniform thin film by providing plural chambers..." ("Abstract").

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Response to Arguments

5. Applicant's arguments filed June 19, 2002 have been fully considered but they are not persuasive.

6. Regarding Applicant's contention that Soichiro "does not teach arrays of holes formed in either of the pipe 5 or the tube 63.", is not convincing. The Examiner has maintained, throughout the prosecution history, that the arrays of holes are formed in

"

both of at least one innermost (item 3, Fig.1,2) tube and at least one outermost (items 2,1, Fig.1,2) tube, both the inner and outermost axially aligned tubes, elongated, nested tubes having an effective annular space (items 18-20, Figures 1,2; "buffers", Constitution) formed between the at least one innermost (item 3, Fig.1,2) and outermost (items 2,1, Fig.1,2) nested tubes; one or more arrays of orifices (items 13, 14, 15; Fig. 1,2) formed in each of the at least innermost (item 3, Fig.1,2) and outermost (items 2,1, Fig.1,2) nested tubes and extending along the substantial length (Figures 1,2) of each of the tubes.

"

As such, Applicant's contention that pipe 5 and tube 63 of Soichiro correspond to an innermost and outermost tube is misdirected.

7. With respect to Applicant's observation concerning Figures 1 and 4 of the translated JP61-037969 to Soichiro where "Note Fig. 1 and Fig. 4 that the Soichiro apparatus has a fairly squat aspect ratio (diameter to length) consistent with its intended application for delivery of

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gases to a volume." - It is well established that drawing dimensions, when used to overcome a reference, are not considered reliable in determining patentability. See MPEP - 2123 and 2125. Regarding the "intended application" and "operating conditions" such as "...along the length of the gas metering tube independent of gas flow rate, temperature, pressure and other operating conditions", it is also well established that apparatus claims must be structurally distinguishable from the prior art where recitations of use or applications of an apparatus does not adequately support patentability of apparatus claims. See MPEP 2114.

8. Applicant's statement that "the objectives stated by Soichiro apply to the cathode apparatus taught therein and not to the structurally distinct gas metering tube of the present invention" is inconsistent with the purpose and structure of the Soichiro reference. Specifically, Soichiro teaches the formation of a "uniform thin film by providing plural chambers in a cathode which is opposed to an anode" thus implying that the uniform film formed is derived from the uniform delivery of the reaction gas at a "uniform rate". Thus if the film deposited is "uniform" spatially then the rates of gas delivery must also be spatially uniform. Support for this conclusion is gained from Applicant's translation of Soichiro who discusses the drawbacks of non-uniform gas delivery - page 5, second, third, and fourth paragraphs.

9. Regarding the stated lack of teaching by Soichiro with regards to changing the dimensions (L,D) of the gas delivery metering tube or vary the distribution ($N_{a_{port}}$) and/or the dimension ($d, A_{port/tube}$) of the orifice and/or tube dimensions to achieve an optimal Soichiro objective, there is ample showing by Soichiro whereby dimensional variations would necessarily

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improve the uniform gas delivery and the uniformity of the deposited film - see Applicant's translation, page 7, paragraph 2, and paragraph 4 last six lines - "The preceding/subsequent ratio for the diameters of the openings 13, 14, and 15 should be kept between 10:1 and 3:1" effecting "the active reaction gas is uniformly and consistently ejected outside the peripheral wall of the cathode 1 through the openings 13 in the peripheral wall of the electrode 1." which provides ample evidence that Soichiro recognizes that by varying the dimensions of openings 13-15 the uniform deposition can be achieved.

10. That Soichiro "is entirely silent on the issue of delivering gases at a uniform rate along the length of the gas metering tube" is not accurate when a full appreciation of the Soichiro apparatus is gained by comparing Soichiro's Figures 1 and Figures 3: Figure 1 shows the detail of the cathode (1, Fig.1) that is shown in relative position with the substrate (24, Fig.3). Here, in Figure 3, item 24 is the cathode as shown as item 1, Fig.1 (page 8, second column). As per the discussion of Soichiro on page 8 first paragraph, the uniformity of the deposition on the substrate 24 (Fig. 3) must occur along the length (largest dimension) of Soichiro's gas metering tube.

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Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (703) 305-1351. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after final fax phone number for the 1763 art unit is (703) 872-9311. The official before final fax phone number for the 1763 art unit is (703) 872-9310. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (703) 308-0661. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (703) 308-1633.


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